

Report

EPA Region 5 Records Ctr.



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177

EVALUATION OF IMPACT OF GRIFFITH LANDFILL ON THE ACS SITE

**Town of Griffith
Griffith, Indiana**

February 1992

Project: 1575-02-1

**MALCOLM
PIRNIE**

ENVIRONMENTAL ENGINEERS, SCIENTISTS & PLANNERS

January 17, 1992
DRAFT

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ON THE ACS SITE**

**TOWN OF GRIFFITH
GRIFFITH, INDIANA**

February 1992

**MALCOLM PIRNIE, INC.
445 Hutchinson Avenue
Columbus, Ohio 43235**

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1.0 INTRODUCTION

This report evaluates the appropriateness of the inclusion of a portion of the Town of Griffith Landfill in the ACS NPL Site. This evaluation has been performed by assessing the impact of the landfill on the ACS site and vice versa. The following documents were reviewed to prepare this report:

- Initial Site Evaluation for American Chemical Service, Inc., Griffith Indiana (March 1985),
- Remedial Investigation (RI) Report, ACS NPL Site, Griffith, Indiana (November 1990),
- Feasibility Study (FS), ACS NPL Site, Griffith, Indiana (April 1991),
- U.S. EPA RI Report Comments dated April 24, 1991, and
- Remedial Investigation Report (revised), ACS NPL Site, Griffith, Indiana (June 1991).

2.0 SITE DESCRIPTION

The American Chemical Services (ACS) National Priorities List (NPL) Site (Site) is located at 420 South Colfax Avenue in Griffith, Indiana. Although the Site name is ACS, the United States Environmental Protection Agency (U.S. EPA) has defined the Site as including the ACS property (19 acres), the Pazmey Corporation property (2 acres; formerly Kapica Drum, Inc.), and the inactive portion of the Griffith Municipal Landfill (about 15 acres)(Figure 1-2¹).

¹The figures referred to in this report are from the June 1991 Remedial Investigation Report prepared by Warzyn Inc. These figures are reproduced in Appendix A.

3.0 SITE HISTORY

ACS began operations in May 1955 solely as a solvent recovery firm and later also began limited chemical manufacturing. The ACS solvent recovery processes generated still bottom wastes which were originally deposited in the Still Bottoms Pond and the Treatment Lagoon. In 1960's leaching and/or runoff from the pond area reportedly caused vegetation kills in a marsh immediately to the west of the site. The operation of the Still Bottoms Pond and the Treatment Lagoon was terminated in 1972. From 1958 onwards, ACS operated a small landfill known as the Off-site Containment Area. The Off-site Containment Area was utilized for disposal of variety of wastes generated at the ACS plant. From 1968 to 1970, ACS operated an incinerator at their facility and wastes from the incinerator were also deposited in the Off-site Containment Area during this period. In addition to these wastes, general refuse and an estimated 20,000 to 30,000 drums were deposited in the Off-site Containment Area prior to its closure in 1972.

In February 1980 U.S.EPA made the identification and preliminary assessment of ACS as a potential hazardous site. Sampling of soil, leachate and surface water was conducted on the ACS site in May 1980. Ground water sampling was conducted in November 1982. The Hazard Ranking System (HRS) scoring performed for the ACS site generated a composite score of 34.98. The ACS site was proposed for addition to the NPL in September 1983 and was subsequently added to the list in September 1984. No portion of the Griffith Landfill was a part of the ACS site at that time.

The inactive portion of the Griffith Landfill was subsequently included as a part of the superfund site apparently based on the ACS reply to the U.S. EPA Request For Information sent to ACS dated October 1984. This reply stated that hazardous waste from ACS and Kapica Drum, Inc. were disposed of in the landfill. Since the ACS site was added to the NPL list in September 1984, the inclusion of the inactive portion of the Griffith Landfill in the ACS site occurred after the ACS site was placed on the NPL.

The Griffith Municipal Landfill has been an active solid waste disposal facility since the 1950's. The Town of Griffith, in its response to an U.S.EPA Information Request, has maintained that hazardous wastes were never disposed at the landfill. The Town of Griffith further stated that they were careful not to accept hazardous wastes into their landfill. The U.S. EPA letter dated April 24, 1991 required that this information be included in the RI (Item 19, Page 3 of 45).

Phase I and Phase II field work was conducted on the ACS site in July 1989 and March 1990 respectively. A Draft RI report was prepared in November 1990 and a draft FS report was prepared in April 1991. Phase III field work was conducted on the ACS site in January 1991. The U.S.EPA sent a letter commenting on the RI report on April 24, 1991. The RI was revised in June 1991 in response to the U.S.EPA comments. The revised RI report also included the results of the Phase III activities.

4.0 GROUND WATER FLOW

The Remedial Investigation reports for the ACS site indicate that the groundwater flow in the vicinity of the site is towards the dewatering area in the northwest portion of the presently active Griffith Landfill. Therefore, the groundwater flow would be from the ACS facility toward the Griffith Landfill.

According to information obtained during the RI, the site has two aquifers - the upper Calumet Aquifer and the lower Valparaiso Aquifer - separated by a clay confining layer. The upper Calumet Aquifer is composed of sand and gravel ranging in thickness from 5 to 75 feet with an average thickness of 20 feet.

The hydrogeologic investigations at the site consisting of installations and monitoring of piezometers, monitoring wells, and staff gages reveal the following information:

- The highest water levels measured for the site were at the ACS fire pond.
- The lowest water levels measured for the site were at the Town of Griffith's new Landfill excavation. Figure 4-19 of the June 1991 RI report shows a cross-section of the site through the fire pond and the Town of Griffith Landfill excavation.
- A leachate well (LW-1) in the southern corner of the Town of Griffith's inactive landfill indicated that there is also a local southerly flow component in that section of the site.

Figure 4-21 of the June 1991 RI report shows five groundwater paths leaving the ACS facility. The directions of all paths are away from the ACS facility with some of them leading toward the Griffith landfill.

The computer ground water modelling conducted for the FS assumes that the pumping at the Griffith Landfill will be continued throughout the duration of the remedy. However, this may not be the case after the Griffith Landfill closure is completed.

5.0 GROUND WATER CONTAMINANT CONCENTRATIONS

Table 1 summarizes the Phase I, Phase II and Phase III ground water and leachate analytical results for organics. The highest organic chemical concentrations in the ground water were found in three areas:

- The On-Site Containment Area;
- The Still Bottoms/Treatment Lagoon and adjacent area; and
- The Off-Site Containment Area and Kapica/Pazmey Area.

These areas were, therefore, identified as "source areas" in the RI report. No source areas were identified on the Town of Griffith Landfill. The compounds found in the leachate wells at the landfill such as, benzene, toluene, ethyl benzene, and xylene (BTEX), chlorinated benzenes, ketones, phthalates, polynuclear aromatic hydrocarbons (PAHs), and phenols, had significantly lower concentrations than those in the samples from the monitoring wells immediately downgradient of the source areas. The compounds detected in the leachate samples from locations LW-5 and LW-6, collected during Phase III, are similar to but lower in concentration than the contaminants detected in monitoring well MW-16. These results infer contaminant transport from the ACS site to the Griffith landfill. The ground water flow direction shown in Figures, 4-17, 4-18, and 4-18A of the June 1991 RI indicate that locations of LW-5 and LW-6 are downgradient of MW-16. In fact, the U.S.EPA comments dated April 24, 1991 (item 123, Page 18 of 45) state that at least part of the BTEX compounds found in the leachate wells could come from the Off-site Containment Area.

No organic contaminants were found in samples from the monitoring wells MW-1 and MW-15, which are shown to be downgradient from the Griffith landfill in Figure 4-17, 4-18, and 4-18A of the June 1991 RI report. Therefore, the landfill does not appear to be having any impact on groundwater downgradient from it.

Samples from the landfill leachate wells, screened directly in the refuse, indicate normal biological activity associated with any solid waste landfill.

These data show that the Griffith Landfill has had no impact on the groundwater contaminant concentrations in the ACS Superfund site area. On the other hand, the dewatering activities being conducted as a part of landfill operation, most likely prevented

the contamination detected in the source areas from migrating off the Town of Griffith property.

TABLE 1
ACS SUPERFUND SITE
VOLATILE ORGANIC ANALYSES RESULTS

COMPOUND	MONITORING WELL NUMBER				
	MW-1	MW-2	MW-3	MW-4	MW-5
Chloromethane			ND-68J		
Vinyl Chloride					
Chloroethane		ND-130	ND-1900J	ND-250	25J-160
Methylene Chloride		ND-1J		ND-380	ND-50BJ
Acetone			ND-2300BJ	ND-25BJ	
1,1-Dichloroethane				ND-6J	ND-19J
1,2-Dichloroethene (total)		ND-3J			
1,2-Dichloroethane					
2-Butanone					
1,1,1-Trichloroethane					
Trichloroethene					
Benzene		ND-25	1J-100000	520-640J	490-1800
4-Methyl-2-Pentanone					
2-Hexanone					
Tetrachloroethene					
Toluene			ND-2300J		ND-21J
Chlorobenzene		ND-2J			60-96
Ethyl Benzene			ND-780J		830-1100
Xylenes (total)			ND-3000J		210-670

UNITS: µg/l

NOTES: ND NOT DETECTED

J ESTIMATED VALUE

B COMPOUND WAS FOUND IN ASSOCIATED BLANK

NA NOT ANALYZED

D QUANTITATED AT SECONDARY DILUTION FACTOR

SAMPLING DATES: MW-1, 8/1/89. MW-2 & MW-3, 8/2/89 & 5/21/90. MW-4 & MW-5, 8/3/89 & 5/21/90.

TABLE 1 (continued)
ACS SUPERFUND SITE
VOLATILE ORGANIC ANALYSES RESULTS

COMPOUND	MONITORING WELL NUMBER				
	MW-6	MW-7	MW-8	MW-9	MW-10
Chloromethane	140-240		ND-5J	200D-440D 8-14B	
Vinyl Chloride					
Chloroethane					
Methylene Chloride					
Acetone					
1,1-Dichloroethane					
1,2-Dichloroethene (total)					
1,2-Dichloroethane					
2-Butanone					
1,1,1-Trichloroethane					
Trichloroethene	780-1500			ND-5J	
Benzene					
4-Methyl-2-Pentanone					
2-Hexanone					
Tetrachloroethene					
Toluene					
Chlorobenzene					
Ethyl Benzene					
Xylenes (total)					
	52-90				
	170-210				

UNITS: µg/l

NOTES: ND NOT DETECTED

J ESTIMATED VALUE

B COMPOUND WAS FOUND IN ASSOCIATED BLANK

NA NOT ANALYZED

D QUANTITATED AT SECONDARY DILUTION FACTOR

SAMPLING DATES: MW-6, 8/1/89 & 5/21/89. MW-7, MW-8, MW-9, & MW-10, 5/15/90 & 7/10/90.

TABLE 1 (continued)
ACS SUPERFUND SITE
VOLATILE ORGANIC ANALYSES RESULTS

COMPOUND	MONITORING WELL NUMBER				
	MW-10C	MW-11	MW-12	MW-13	MW-14
Chloromethane					
Vinyl Chloride					
Chloroethane	3J		23-24	140-500D	3J-7J
Methylene Chloride	10B	ND-10BJ	ND-10BJ	7-10B	ND-10BJ
Acetone		ND-10BJ	ND-10BJ		ND-10BJ
1,1-Dichloroethane			ND-1J		
1,2-Dichloroethene (total)					
1,2-Dichloroethane		ND-2J			
2-Butanone					
1,1,1-Trichloroethane					
Trichloroethene					
Benzene			ND-12	ND-2J	2J-6
4-Methyl-2-Pentanone	3J				
2-Hexanone					
Tetrachloroethene					
Toluene					
Chlorobenzene			4J-6		
Ethyl Benzene					
Xylenes (total)					

UNITS: µg/l

NOTES: ND NOT DETECTED

J ESTIMATED VALUE

B COMPOUND WAS FOUND IN ASSOCIATED BLANK

NA NOT ANALYZED

D QUANTITATED AT SECONDARY DILUTION FACTOR

SAMPLING DATES: MW-10C, 7/25/89. MW-11, MW-12, & MW-13, 5/16/90 & 7/11/90. MW-14, 5/16/90, 5/17/90, & 7/11/90.

TABLE 1 (continued)
ACS SUPERFUND SITE
VOLATILE ORGANIC ANALYSES RESULTS

COMPOUND	MONITORING WELL NUMBER		
	MW-15	MW-16	MW-17
Chloromethane			
Vinyl Chloride		380J-720	
Chloroethane	ND-4J	1600-2000	
Methylene Chloride	ND-10BJ	ND-520B	
Acetone	ND-10BJ	84000D-99000D	
1,1-Dichloroethane		1500-2400	
1,2-Dichloroethene (total)		250-400	130
1,2-Dichloroethane			
2-Butanone		150000D-220000D	
1,1,1-Trichloroethane			
Trichloroethene			45
Benzene	ND-5J	1400-1800	
4-Methyl-2-Pentanone		45000D-54000D	
2-Hexanone		1200-1800	
Tetrachloroethene			200
Toluene		220J-360	
Chlorobenzene			
Ethyl Benzene			80
Xylenes (total)			47

UNITS: µg/l

NOTES: ND NOT DETECTED

J ESTIMATED VALUE

B COMPOUND WAS FOUND IN ASSOCIATED BLANK

NA NOT ANALYZED

D QUANTITATED AT SECONDARY DILUTION FACTOR

SAMPLING DATES: MW-15 & MW-16, 5/17/90 & 7/11/90. MW-17, 5/16/90.

TABLE 1 (continued)
ACS SUPERFUND SITE
VOLATILE ORGANIC ANALYSES RESULTS

COMPOUND	LEACHATE WELL NUMBER					
	LW-1	LW-2	LW-3	LW-4	LW-5	LW-6
Chloromethane						
Vinyl Chloride						
Chloroethane						2J
Methylene Chloride	5BJ	5BJ		5BJ		
Acetone			380	81	150BJ	
1,1-Dichloroethane					4J	
1,2-Dichloroethene (total)					6	
1,2-Dichloroethane						
2-Butanone			830	170	90	100
1,1,1-Trichloroethane					4	2J
Trichloroethene					4J	
Benzene	5	2J	5J	6J	19	1J
4-Methyl-2-Pentanone			24J		83	6J
2-Hexanone					2J	4J
Tetrachloroethene						
Toluene			29	70	9	10
Chlorobenzene				48		
Ethyl Benzene			34	48	1J	2J
Xylenes (total)			69	120	4J	4J

UNITS: µg/l

NOTES: ND NOT DETECTED

J ESTIMATED VALUE

B COMPOUND WAS FOUND IN ASSOCIATED BLANK

NA NOT ANALYZED

D QUANTITATED AT SECONDARY DILUTION FACTOR

SAMPLING DATES: LW-1 & LW-4, 7/27/89. LW-2 & LW-3, 7/28/89. LW-5 & LW-6, 1/18/91.

TABLE 1 (continued)
ACS SUPERFUND SITE
SEMI-VOLATILE ORGANIC ANALYSES RESULTS

COMPOUND	MONITORING WELL NUMBER				
	MW-1	MW-2	MW-3	MW-4	MW-5
Phenol			5J-240	3J-10	ND-21
bis(2-Chloromethyl)ether		ND-6J	120-160J	4J-8J	ND-8J
1,3-Dichlorobenzene					ND-3J
1,4-Dichlorobenzene			3J-3J		6J-10
1,2-Dichlorobenzene			23-29		15-33
2-Methylphenol			ND-13		
bis(2-Chloroisopropyl)ether			ND-300		59-67
4-Methylphenol			45-78		
Isophorone					
2,4-Dimethylphenol			8J-110		ND-6J
Benzoic Acid					ND-13J
Naphthalene			ND-3J		64-71
4-Chloro-3-Methylphenol					ND-2J
2-Methylnaphthalene					9J-27
Diethylphthalate			3J-9J		
Pentachlorophenol					
Di-n-butylphthalate					
bis(2-Ethylhexyl)phthalate		ND-2J	ND-5J		ND-3J
PCB-1248				ND-2.6	

UNITS: µg/l

NOTES: ND NOT DETECTED

J ESTIMATED VALUE

B COMPOUND WAS FOUND IN ASSOCIATED BLANK

NA NOT ANALYZED

D QUANTITATED AT SECONDARY DILUTION FACTOR

SAMPLING DATES: MW-1; 8/1/89. MW-2 & MW-3, 8/2/89 & 5/21/90. MW-4 & MW-5, 8/3/89 & 5/21/90.

TABLE 1 (continued)
ACS SUPERFUND SITE
SEMI-VOLATILE ORGANIC ANALYSES RESULTS

COMPOUND	MONITORING WELL NUMBER				
	MW-6	MW-7	MW-8	MW-9	MW-10
Phenol	3J-4J				
bis(2-Chloromethyl)ether	13J-22			11-12	
1,3-Dichlorobenzene					
1,4-Dichlorobenzene					
1,2-Dichlorobenzene					
2-Methylphenol					
bis(2-Chloroisopropyl)ether					
4-Methylphenol					
Isophorone	25-35				
2,4-Dimethylphenol					
Benzoic Acid	9J-11J				
Naphthalene	ND-7J				
4-Chloro-3-Methylphenol					
2-Methylnaphthalene					
Diethylphthalate					
Pentachlorophenol	ND-3J				
Di-n-butylphthalate					
bis(2-Ethylhexyl)phthalate	ND-29				

UNITS: µg/l

NOTES: ND NOT DETECTED

J ESTIMATED VALUE

B COMPOUND WAS FOUND IN ASSOCIATED BLANK

NA NOT ANALYZED

D QUANTITATED AT SECONDARY DILUTION FACTOR

SAMPLING DATES: MW-6, 8/1/89 & 5/21/89. MW-7, MW-8, MW-9, & MW-10, 5/15/90 & 7/10/90.

TABLE 1 (continued)
ACS SUPERFUND SITE
SEMI-VOLATILE ORGANIC ANALYSES RESULTS

COMPOUND	MONITORING WELL NUMBER				
	MW-10C	MW-11	MW-12	MW-13	MW-14
Phenol	NA				ND-14
bis(2-Chloromethyl)ether	NA		140-150		
1,3-Dichlorobenzene	NA				
1,4-Dichlorobenzene	NA				
1,2-Dichlorobenzene	NA				
2-Methylphenol	NA				ND-5J
bis(2-Chloroisopropyl)ether	NA				
4-Methylphenol	NA				ND-12
Isophorone	NA				
2,4-Dimethylphenol	NA				
Benzoic Acid	NA				
Naphthalene	NA				
4-Chloro-3-Methylphenol	NA				
2-Methylnaphthalene	NA				
Diethylphthalate	NA				
Pentachlorophenol	NA				
Di-n-butylphthalate	NA				
bis(2-Ethylhexyl)phthalate	NA	ND-2J			

UNITS: µg/l

NOTES: ND NOT DETECTED

J ESTIMATED VALUE

B COMPOUND WAS FOUND IN ASSOCIATED BLANK

NA NOT ANALYZED

D QUANTITATED AT SECONDARY DILUTION FACTOR

SAMPLING DATES: MW-10C, 7/25/89. MW-11, MW-12, & MW-13, 5/16/90 & 7/11/90. MW-14, 5/16/90, 5/17/90, & 7/11/90.

TABLE 1 (continued)
ACS SUPERFUND SITE
SEMI-VOLATILE ORGANIC ANALYSES RESULTS

COMPOUND	MONITORING WELL NUMBER		
	MW-15	MW-16	MW-17
Phenol	ND-5J	ND-37	
bis(2-Chloromethyl)ether		ND-250	
1,3-Dichlorobenzene			
1,4-Dichlorobenzene			
1,2-Dichlorobenzene			7J
2-Methylphenol	ND-2J	ND-38	
bis(2-Chloroisopropyl)ether			
4-Methylphenol	ND-5J	ND-2200D	
Isophorone		ND-19	
2,4-Dimethylphenol			
Benzoic Acid	ND-3J	2J-1900D	
Naphthalene			48
4-Chloro-3-Methylphenol			
2-Methylnaphthalene			15
Diethylphthalate			
Pentachlorophenol			2J
Di-n-butylphthalate			2J
bis(2-Ethylhexyl)phthalate	ND-9J		50
PCB-1260			27

UNITS: µg/l

NOTES: ND NOT DETECTED

J ESTIMATED VALUE

B COMPOUND WAS FOUND IN ASSOCIATED BLANK

NA NOT ANALYZED

D QUANTITATED AT SECONDARY DILUTION FACTOR

SAMPLING DATES: MW-15 & MW-16, 5/17/90 & 7/11/90. MW-17, 5/16/90.

TABLE 1 (continued)
ACS SUPERFUND SITE
SEMI-VOLATILE ORGANIC ANALYSES RESULTS

COMPOUND	LEACHATE WELL NUMBER					
	LW-1	LW-2	LW-3	LW-4	LW-5	LW-6
Phenol			61	3J	4J	8J
bis(2-Chloromethyl)ether	2J				3J	
1,3-Dichlorobenzene			2J			
1,4-Dichlorobenzene				5J		
1,2-Dichlorobenzene						
2-Methylphenol				3J	3J	
bis(2-Chloroisopropyl)ether						
4-Methylphenol			770D	120	10	
Isophorone						
2,4-Dimethylphenol				3J		
Benzoic Acid	7J	19J		110	7J	
Naphthalene			21	3J		
4-Chloro-3-Methylphenol						
2-Methylnaphthalene			4J			
Diethylphthalate			27	5J		
Pentachlorophenol		19J				
Di-n-butylphthalate						
bis(2-Ethylhexyl)phthalate			15			
Dibenzofuran			3J			
Fluorene			4J			
Phenanthrene			3J			
Fluoranthene			4J			
Pyrene			2J			

UNITS: µg/l

NOTES: ND NOT DETECTED

J ESTIMATED VALUE

B COMPOUND WAS FOUND IN ASSOCIATED BLANK

NA NOT ANALYZED

D QUANTITATED AT SECONDARY DILUTION FACTOR

SAMPLING DATES: LW-1 & LW-4, 7/27/89 LW-2 & LW-3, 7/28/89. LW-5 & LW-6, 1/18/91.

6.0 PROPOSED REMEDIATION PLAN FOR GRIFFITH LANDFILL

The FS report recommends remediation of the ACS Site groundwater by "pump-and-treat" process. A slurry wall is being considered to isolate the groundwater in the "source areas" from areas which are not proposed for remediation, such as the Landfill. The only action proposed for the landfill is monitoring as part of its operating and closure plans. The FS has also concluded that the landfill does not require remediation; consistent with the findings of the RI.

Closure of the landfill would be done under the Indiana Department of Environmental Management (IDEM) rules and regulations for solid waste disposal.

7.0 SUMMARY AND CONCLUSIONS

The following conclusions are reached based on the review of the documents mentioned earlier:

- The Griffith Landfill was not a part of the ACS site when the ACS site was added to the NPL. Therefore, it can be excluded from the scope of the site without going through the delisting process.
- The RI has indicated that the contaminant source areas are on the ACS property and the Kapica/ Pazmey area and not on the Griffith Landfill.
- Ground water flows from ACS site towards Griffith Landfill.
- Leachate samples from Griffith landfill show a limited similarity of common constituents, but at reduced concentrations, with those detected in ground water samples from the ACS site.
- Except for the constituents similar to those detected in the ground water from the ACS site, samples from the leachate wells on the Griffith Landfill indicate leachate characteristics representative of normal biological activity associated with a solid waste landfill.
- The RI has not revealed any indication that the landfill leachate has impacted the groundwater quality. However, some of the compounds found in the leachate wells can be attributed to the source areas on the ACS property.
- Monitoring wells downgradient of the Griffith Landfill show no impact from the landfill on the ground water quality.
- The dewatering activities at the landfill may have prevented the ground water contamination detected in the vicinity of MW-16 from migrating off-site.

Based on the above findings, The Griffith Landfill should be excluded from the boundaries of the ACS NPL site. The landfill closure and ground water monitoring will be implemented in accordance with the IDEM rules and regulations for solid waste disposal facilities. While evaluating the remedial options for the ground water at the ACS site, the impact of possible termination of the leachate pumping activities subsequent to the closure of the Griffith Landfill should be considered.

APPENDIX A

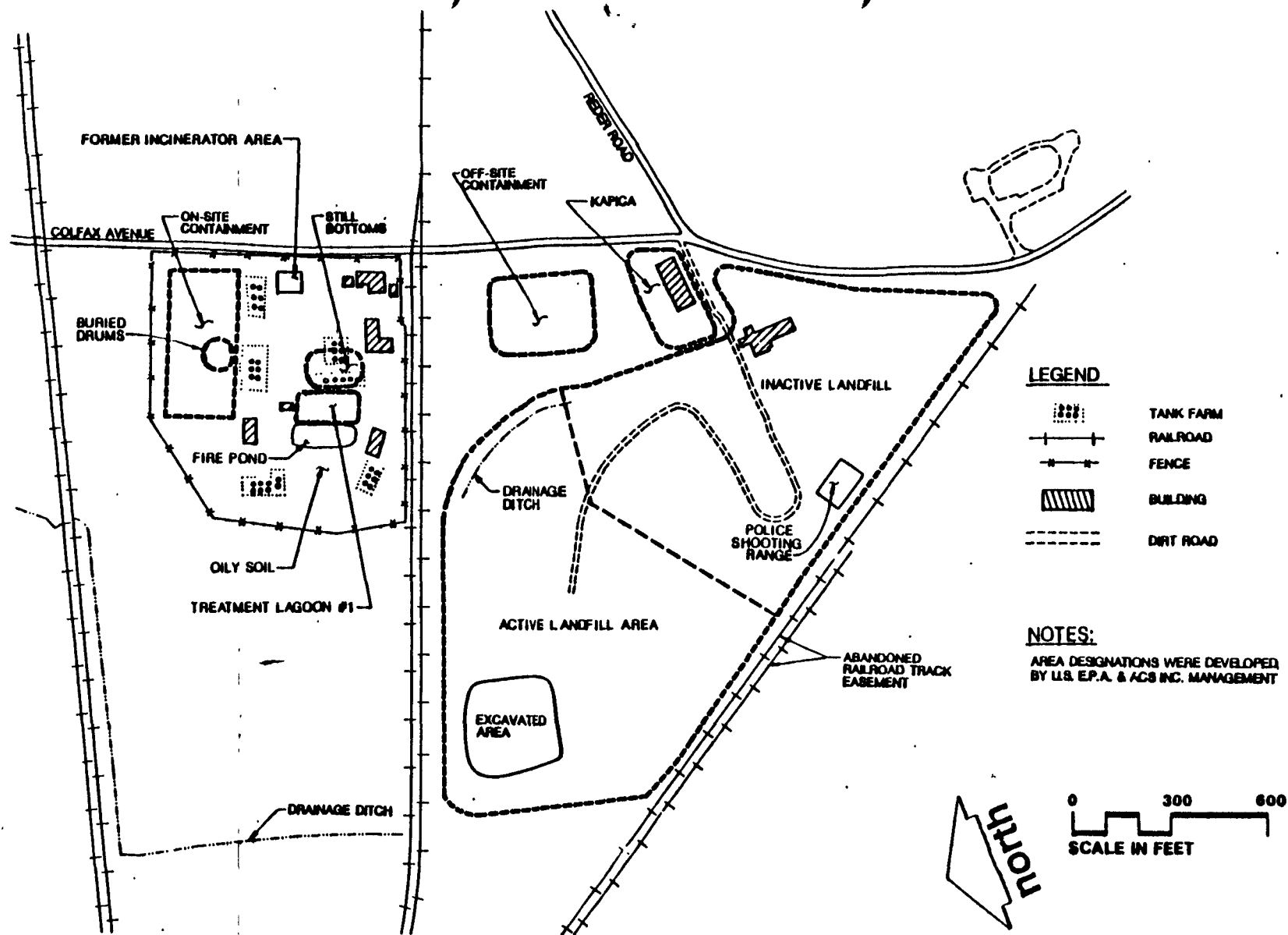
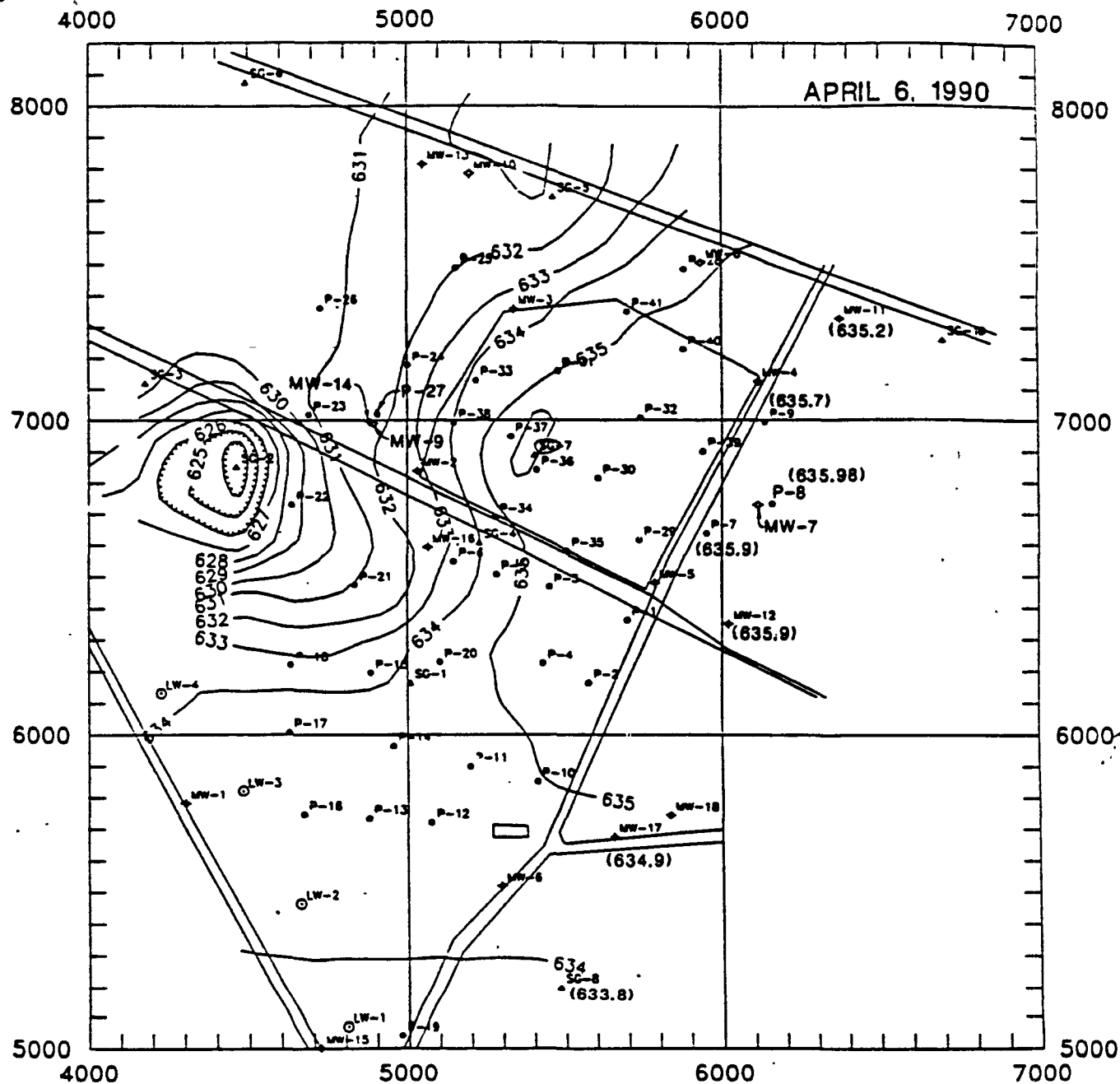


FIGURE 1-2



LEGEND

- (632.7) GROUNDWATER ELEVATION
- ◆ UPPER AQUIFER MONITORING WELL LOCATION
- ◇ LOWER AQUIFER MONITORING WELL LOCATION
- ⊙ LEACHATE WELL LOCATION
- PIEZOMETER LOCATION
- ▲ STAFF GAUGE LOCATION
- 620- WATER LEVEL CONTOUR LINE

NOTES

1. A GROUNDWATER ELEVATION FOR MW-1 WAS NOT AVAILABLE. THIS WELL WAS DESTROYED PRIOR TO WATER LEVEL MEASUREMENT.
2. THE GROUNDWATER ELEVATION AT P-18 WAS NOT USED IN MAP CONSTRUCTION. THE ELEVATION AT THIS PIEZOMETER WAS APPROXIMATELY 10 FT. HIGHER THAN ADJACENT GROUNDWATER ELEVATIONS.



FIGURE 4-17



WATER TABLE CONTOUR MAP
APRIL 6, 1990
REMEDIAL INVESTIGATION
AMERICAN CHEMICAL SERVICES
NPL SITE
COLUMBIA, INDIANA

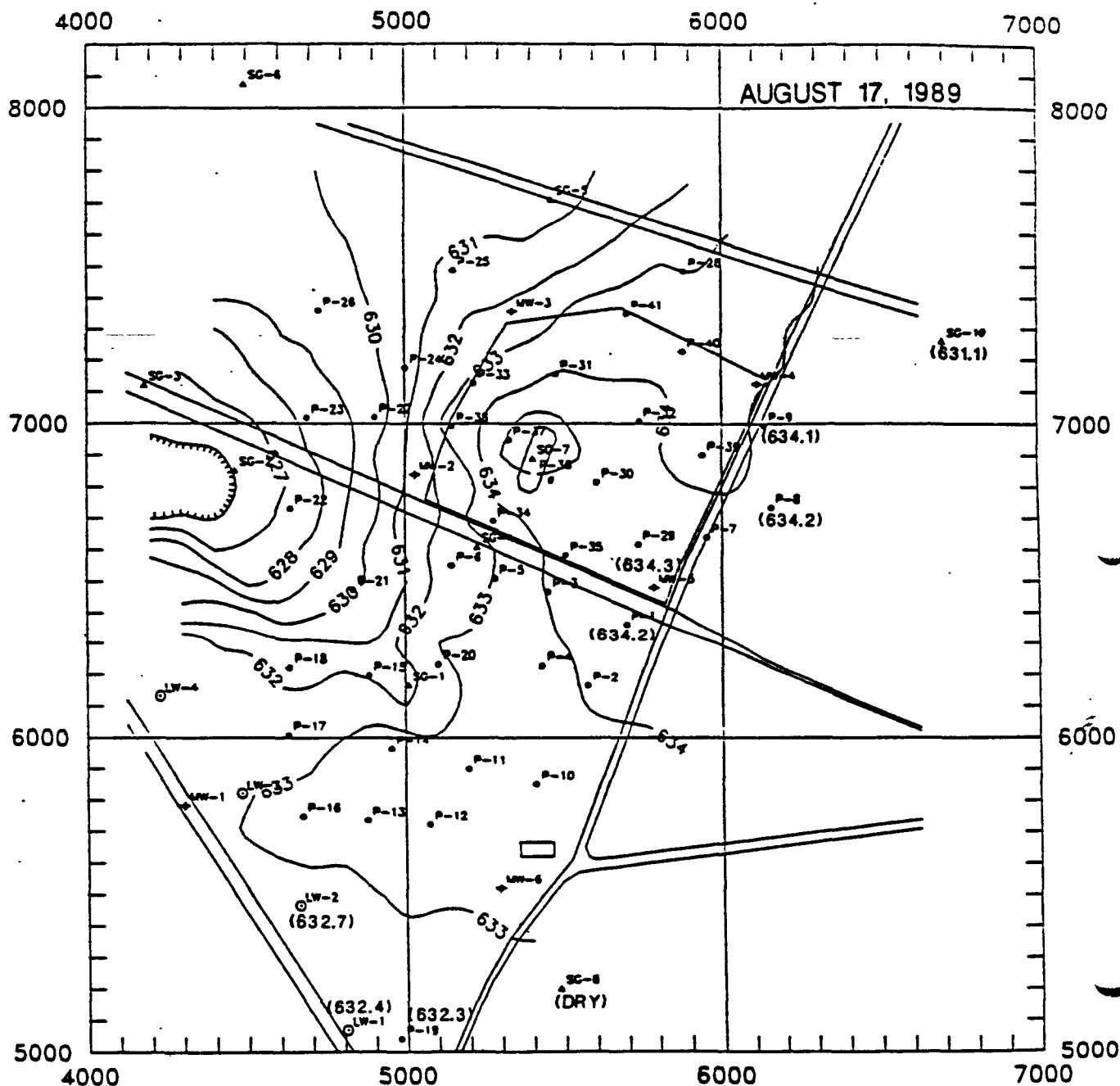
Drawn
D.L.L., T.J.M., J.A.W.
Revisions

Checked JAW

App'd. *[Signature]*
Date 9/21/90

60251

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LEGEND

- (632.7) GROUNDWATER ELEVATION
- UPPER AQUIFER MONITORING WELL LOCATION
- ◆ LOWER AQUIFER MONITORING WELL LOCATION
- LEACHATE WELL LOCATION
- PIEZOMETER LOCATION
- ▲ STAFF GAUGE LOCATION
- 620— WATER LEVEL CONTOUR LINE

NOTES

1. THE GROUNDWATER ELEVATION AT P-18 WAS NOT USED IN MAP CONSTRUCTION. THE ELEVATION AT THIS PIEZOMETER WAS APPROXIMATELY 10 FT. HIGHER THAN ADJACENT GROUNDWATER ELEVATIONS.

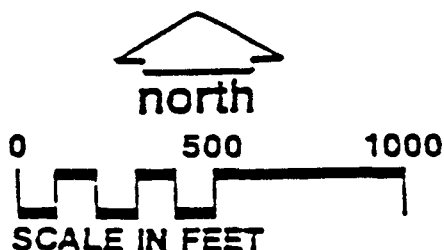
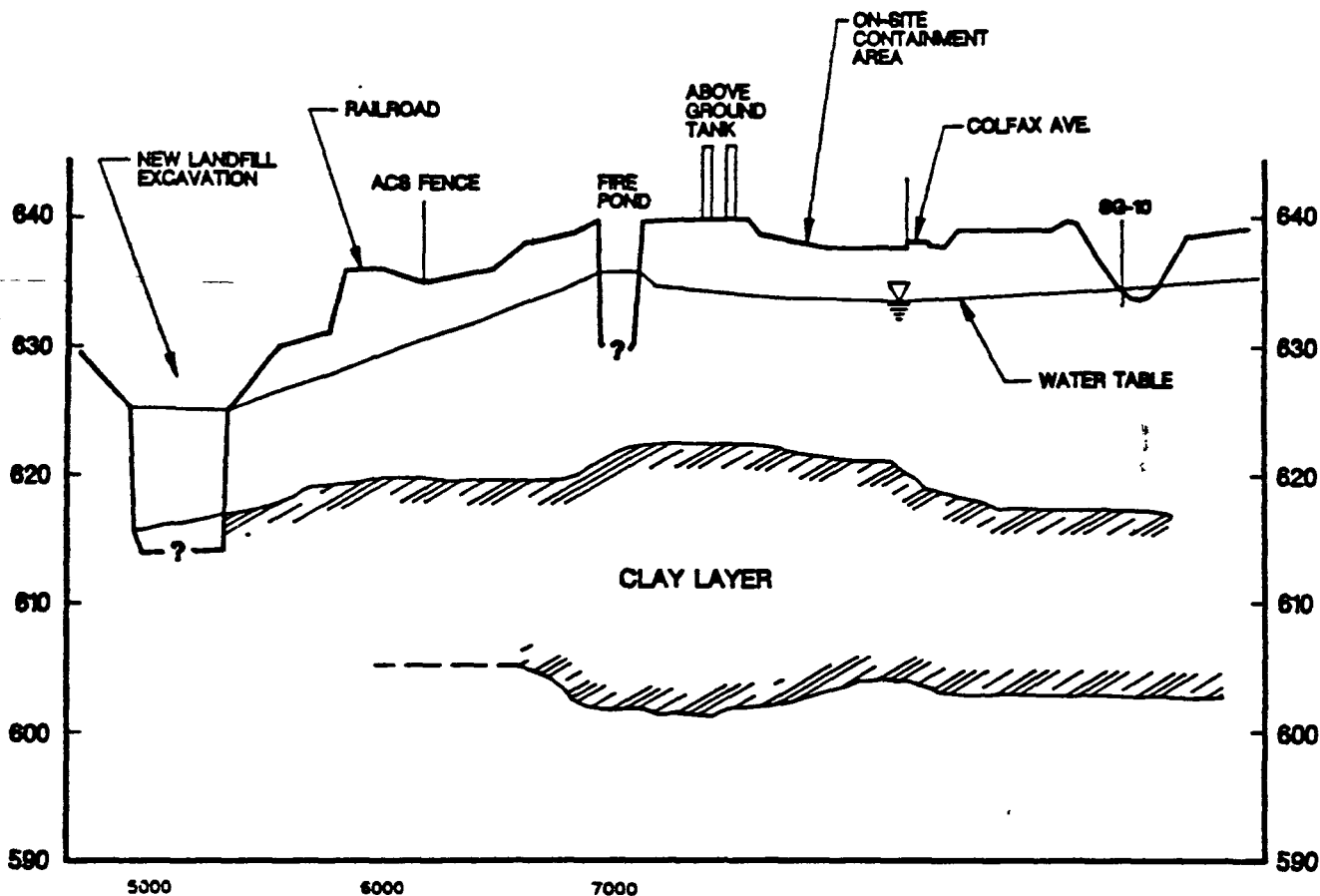


FIGURE 4-18

WARZYN 	WATER TABLE CONTOUR MAP AUGUST 17, 1989 REMEDIAL INVESTIGATION AMERICAN CHEMICAL SERVICES NPL SITE GRIFFITH INDIANA	Drawn DLL., T.J.M., J.A.W. Revisions	Checked JAW	App'd. <i>JSV</i> Date 9/21/90
	60251			
	A9			



NOTES

1. DEPTH OF FIRE POND AND NEW LANDFILL EXCAVATION UNKNOWN.

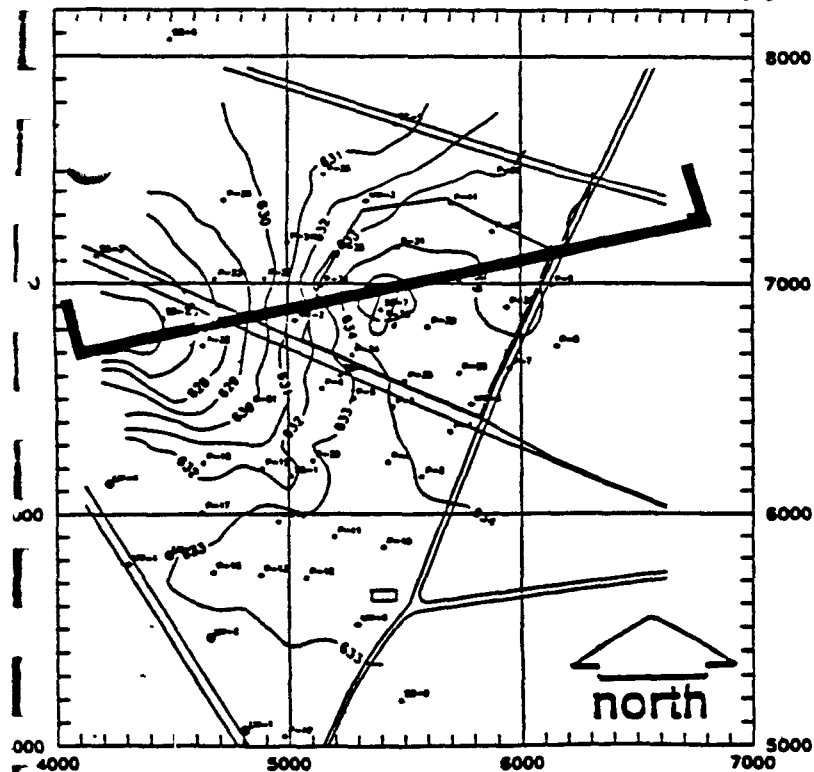
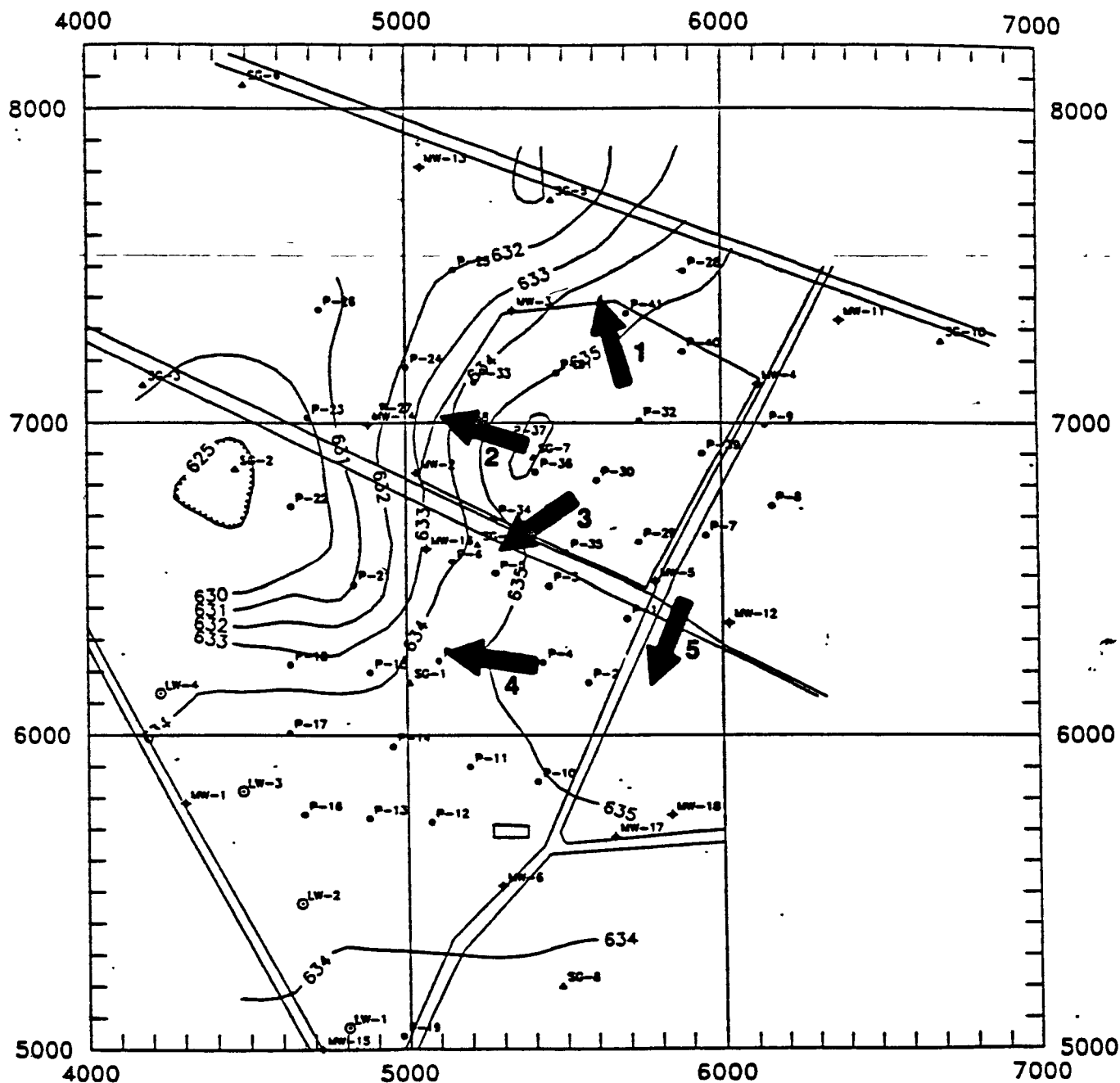


FIGURE 4-19

WARZYN 	SITE CROSS-SECTION ILLUSTRATING CLAY CONFINING LAYER THICKNESS REMEDIAL INVESTIGATION AMERICAN CHEMICAL SERVICES NDI CTF	Drawn ELR, DLL, TJM, JAW Revisions	Checked JAW	App'd. PSH
				Date 9/21/96



LEGEND

- UPPER AQUIFER MONITORING WELL LOCATION
- LEACHATE WELL LOCATION
- PIEZOMETER LOCATION
- ▲ STAFF GAUGE LOCATION
- 1 ← GROUNDWATER FLOW PATH

NOTES

1. GROUNDWATER FLOW PATHS ARE DESCRIBED IN TABLE 4-5.

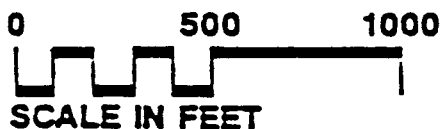


FIGURE 4-21



UPPER AQUIFER GROUNDWATER
FLOW PATHS
REMEDIAL INVESTIGATION
AMERICAN CHEMICAL SERVICES
NPL SITE

Drawn
DLL/TJM/JAW
Revisions

Checked JAW

App'd. *[Signature]*
Date 9/21/96
60251 A11